Andrew Schechtman-Rook
rook166@gmail.com — (917)-836-4267

SUMMARY

- 8+ years of experience with analysis of large, complex datasets.
- Strong programming, numerical analysis, and visualization skills.
- Extensive familiarity with linear and non-linear model fitting.
- Experience writing software for both parallel and distributed environments.
- Able to work independently as well as part of a team.
- Practiced writer and speaker for technical and non-technical audiences.

SKILLS

Programming: C++, Python (including Matplotlib, Numpy, Scikit-learn, Scipy), shell scripting.
Databases and Web Design: Django, HTML, MySQL, PHP.
Operating Systems: Linux, Mac OS X.
Data Analysis: Bootstrapping; genetic algorithms; image processing and machine vision; interpolation; linear and non-linear regression; Monte Carlo; numerical integration and differentiation; parallel and distributed computing; principal component analysis; rootfinding.
Oral Presentations: Described advanced analysis and modeling to both expert and non-expert audiences through engaging lectures and informal discussions.
Writing: Published research in leading scientific journals (full list available upon request).

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate 2014-Present
University of Wisconsin-Madison

- Devised metrics to improve correspondence between numerical models and astronomical data. Implemented in highly optimized Python, was able to refine agreement by up to 20% with minimal increase in computation time.
- Built a fast Voronoi Tessellation algorithm to adaptively bin images, preserving spatial resolution while maximizing signal in images with over one million pixels.
- Constructed visualization tools using Matplotlib to aid data processing efforts.
- Trained and mentored undergraduate and graduate students in programming, data analysis and statistical methods.

Research Assistant 2007-2013
University of Wisconsin-Madison

- Developed non-linear Levenberg-Marquardt χ^2 fitting algorithms using a combination of Python and C++ to constrain models of spiral galaxies to data.
- Employed on-campus distributed computing resources to perform large-scale modeling in parallel, using over 20 years of computer time in 1 month.
- Assembled a hybrid C++/Python processing pipeline to clean, register, and mosaic hundreds of high-resolution images with minimal user intervention, resulting in a factor of 10+ increase in analysis precision.
- Created a genetic algorithm in C++ to efficiently fit galaxy models with unusually large numbers of free parameters to high-resolution images.
- Utilized frequency-domain analysis to understand the spatial distribution of galactic structure.
- Computed descriptive statistics about 200+ astronomical objects from raw survey data automatically via custom-built analysis software blending C++ and shell scripting programs.
- Implemented methods comparing different fitting statistics to compute global best-fitting parameters for multiple datasets.
- Discovered and classified a previously unknown galaxy by simultaneously using data from seven different sources.

Teaching Assistant 2008-2009

University of Wisconsin-Madison

- Taught six discussion sections of an introductory undergraduate astronomy course.
- Prepared engaging lesson plans, including interactive demonstrations and group problem-solving activities.

Research Assistant 2006-2007

Case Western Reserve University

- Designed and executed statistical analyses of simulated galaxy clusters to optimize strategy for future data acquisition.
- Used nearest-neighbor and regression analysis to compute a transform between astronomical filter systems.

Physics Lab Assistant 2005-2006

Case Western Reserve University

- Maintained existing equipment and computers for introductory physics labs.
- Developed and built components for new labs.
- Upgraded hardware and software for over 20 lab computers.

OTHER RELEVANT EXPERIENCE

Independent NFL Analyst 2013-Present

phdfootball.blogspot.com

- Performed novel statistical analyses on publicly available NFL data.
- Mined a play-by-play database containing over 500,000 records across dozens of tables for complex relationships between individual players as well as teams.
- Developed custom software and visualization tools using MySQL and Python to efficiently examine thousands of plays.
- Explained findings in a manner accessible to all audiences through both written posts and evocative figures.

EDUCATION

Ph.D., Astronomy, University of Wisconsin-Madison December 2013

- Wisconsin Space Grant Consortium Graduate Fellowship
- International Astronomical Union Travel Grant
- American Astronomical Society Chambliss Student Award
- University of Wisconsin-Madison Astronomy Department Whitford Award

MS, Astronomy, University of Wisconsin-Madison June 2009

BS, Astronomy, Case Western Reserve University May 2007

- Graduated *cum laude*
- Minors in Physics and Classics